

Missouri Department of Natural Resources

Total Maximum Daily Load Information Sheet

Shoal Creek

Waterbody Segment at a Glance:

Counties:	Newton, Barry
Nearby Cities:	Neosho and Monett
Length of impairment:	13.5 miles
Pollutant:	Fecal Coliform
Source:	Unknown Agricultural Sources



TMDL Priority Ranking: TMDL approved 2003

Description of the Problem

Beneficial uses of Shoal Creek

- Livestock and Wildlife Watering
- Protection of Warm Water Aquatic Life
- Protection of Human Health associated with Fish Consumption
- Irrigation
- Cool Water Fishery
- Whole Body Contact Recreation (Swimming)
- Boating and Canoeing

Use that is impaired

- Whole Body Contact Recreation (Swimming)

Standards that apply

- Missouri's Water Quality Standards at 10 CSR 20-7.031(4)(C) state that the fecal coliform count shall not exceed 200 colonies per 100 milliliters of water (200 col/100 mL) during the recreational season (April 1-October 31) in waters designated for whole-body contact recreation.

In studies performed from 1958 through 1979, the water quality in Shoal Creek was reported as excellent and the stream pronounced "unpolluted." In a United States Geological Survey (USGS) report in 1992 it was described as a true Ozarkian stream with rolling Ozark hills, picturesque mill dams, bedrock riffles, gently eddying pools and long shaded reaches. However, Shoal Creek is presently listed as impaired due to levels of fecal coliform bacteria above state water quality standards. Fecal coliform are non-pathogenic (do not cause human illness) bacteria that are found in the gut of

warm blooded animals and are used as indicators of the risk of waterborne disease from pathogenic bacteria or viruses.

To deal with this problem, a TMDL for Shoal Creek was written and the U.S. Environmental Protection Agency approved it November 18, 2003. The endpoint for the TMDL is to bring Shoal Creek back to the Water Quality Standard of 200 col/100 mL. The department contracted the Food and Agriculture Policy Research Institute (FAPRI) at the University of Missouri to do an analysis and simulation of the Shoal Creek basin (watershed) to determine how much bacteria are in the creek and how they get there. This study also attempted to determine the source of bacteria using genetic analysis, known as DNA Source Tracking. The goal was to identify if humans or specific types of animals, such as cattle, horses, or poultry, were the primary source of contamination. These studies indicated humans and cattle were the major contributors of bacteria, with other domestic animals and wildlife making a smaller contribution. Poultry litter was found to cause significant loading only during periods of high surface runoff, which occurs less than 15 percent of the time.

To come up with remedial actions that could improve the stream, several scenarios were run using the Soil and Water Assessment Tool (SWAT) model. This model can assess which alternative management practices will lead to stream fecal coliform concentrations that will meet Water Quality Standards. The following scenarios show the most promise for reducing the fecal coliform concentrations in Shoal Creek:

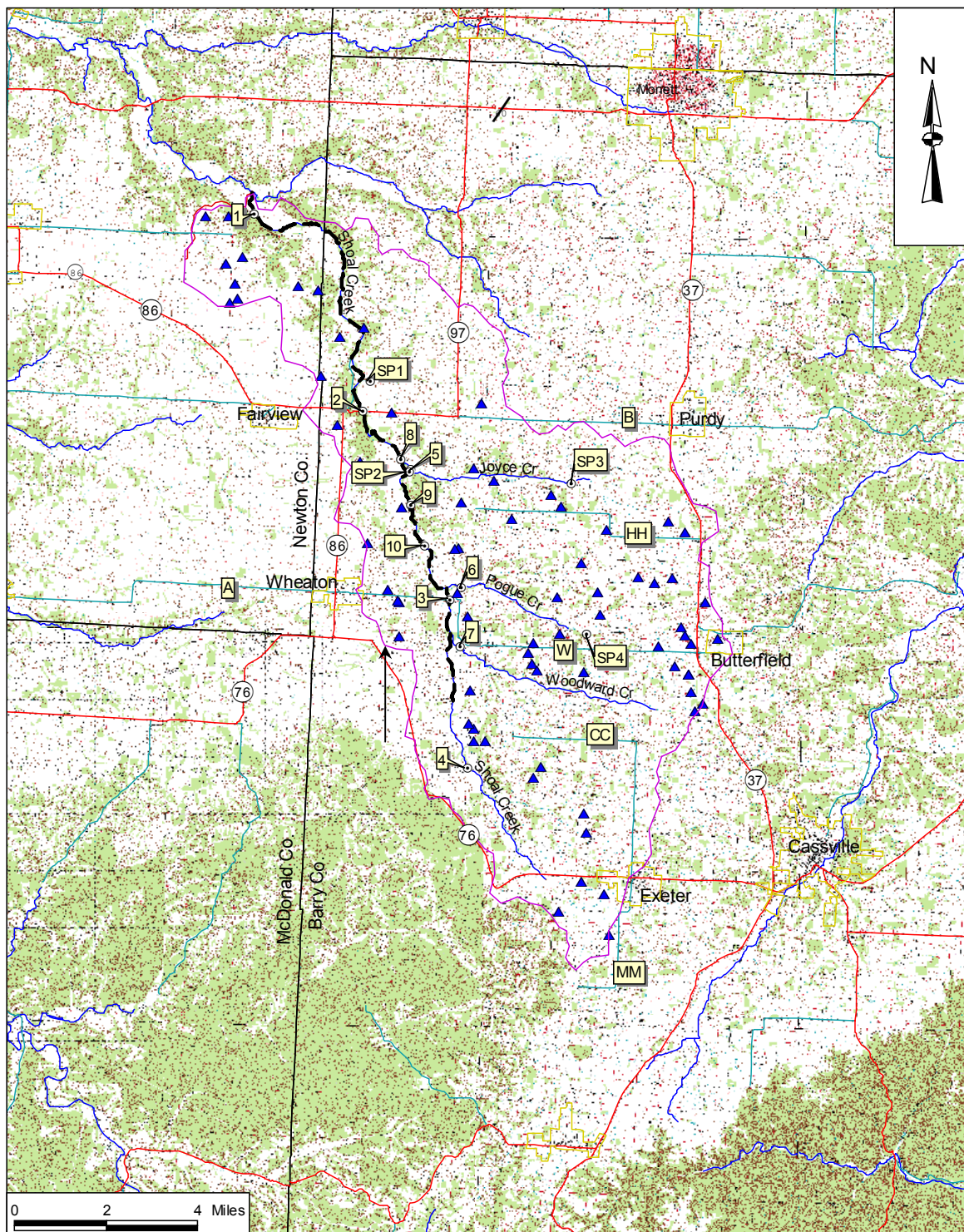
- A 100 percent reduction of the sanitary sewage that reaches the stream
- A 50 to 100 percent reduction of the cattle standing in the streams
- A 66 percent reduction in the fecal coliform loadings due to surface runoff events

A watershed action group has been formed from stakeholders in the upper Shoal Creek watershed. The Shoal Creek Watershed Improvement Group has suggested the following possible solutions to achieve the scenarios above:

- Educate owners and installers of septic systems
- Offer monetary incentives to landowners to maintain their systems
- Remove cattle from the creek
 - Provide alternative water sources
 - Provide stream fencing, shade and feed outside the riparian corridor
 - Limit access to creek
- Address runoff from poultry litter spread on fields
 - Provide education on effective stream buffers
 - Reduce amount of litter (or level of bacteria in litter applied) in these ways:
 - Transport litter outside the watershed
 - Incinerate litter/co-generation (e.g., heat the poultry house with energy from incineration)
 - Compost litter in-house prior to application

A map with sampling sites and graphs of data may be found below.

Shoal Creek in Barry and Newton Counties, Missouri, Showing Sampling Sites and the Impaired Segment

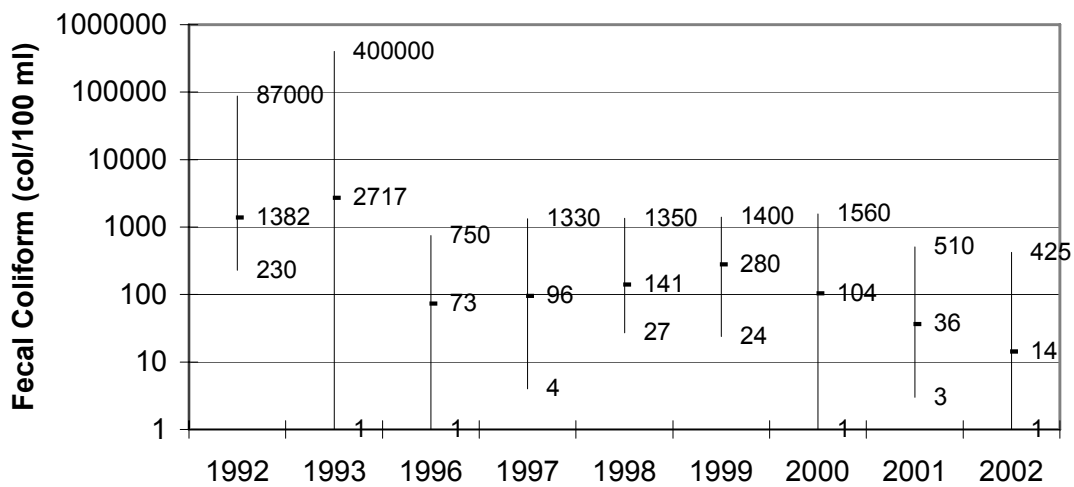


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|----------------------|-------------------------------------------------|
| --- Impaired segment | ▲ Concentrated Animal Feeding Operations |
| → Direction of Flow | — Outline of watershed for the impaired segment |

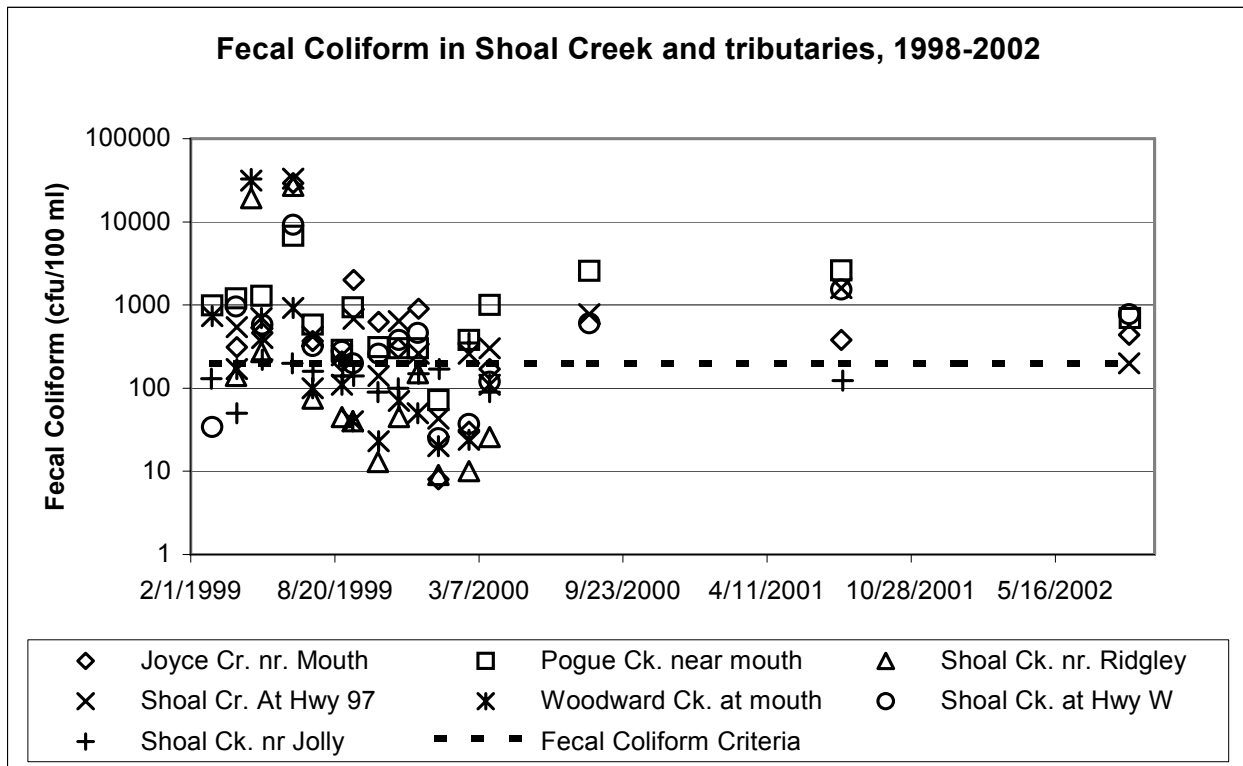
Index to Sampling Sites

1. Shoal Creek near mouth of Capps Creek
2. Shoal Creek at Highway 97
3. Shoal Creek at Highway W
4. Shoal Creek near Ridgley
5. Joyce Creek near mouth
6. Pogue Creek near mouth
7. Woodward Creek at mouth
8. Shoal Creek at County Road 2090
9. Shoal Creek at County Road 2100
10. Shoal Creek at County Road 2110
- SP1. Renkoski Spring
- SP2. Roller Spring
- SP3. Fly Spring
- SP4. Dilbeck Spring

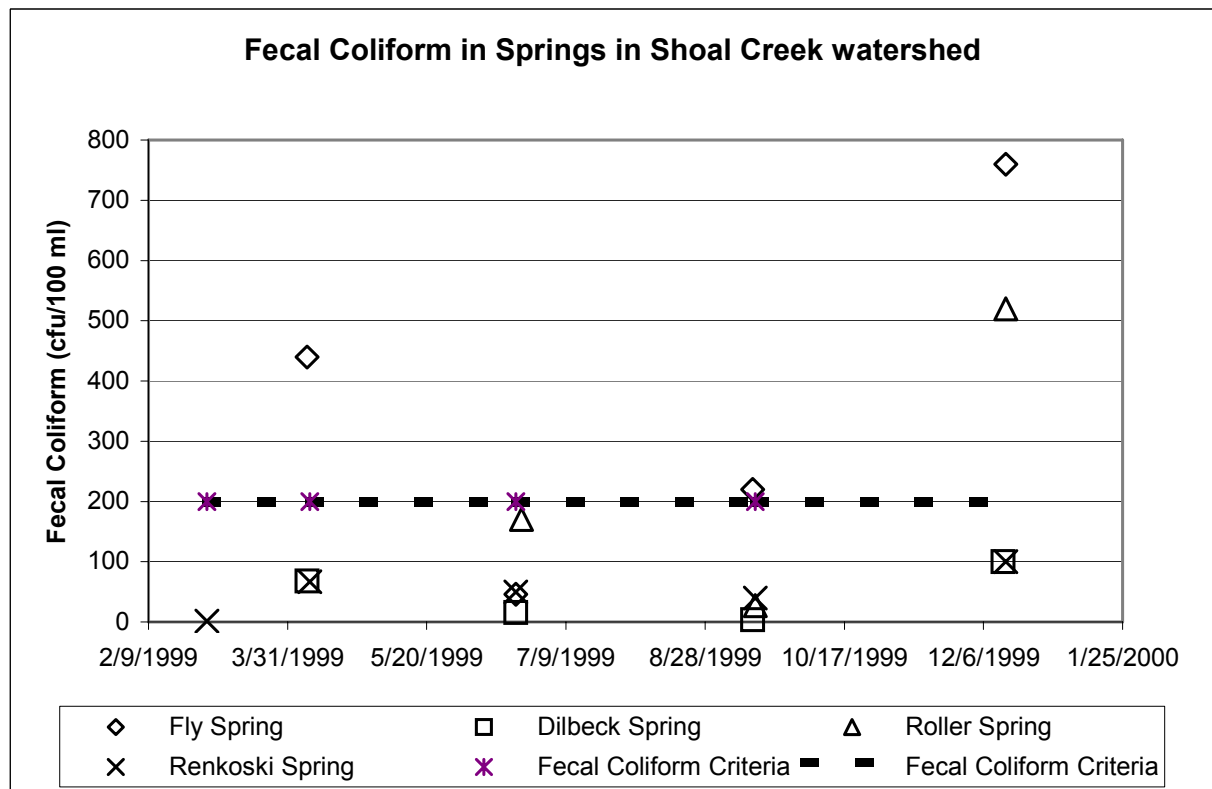
Ranges and Geometric Means of Fecal Coliform levels in Shoal Creek at Highway 97



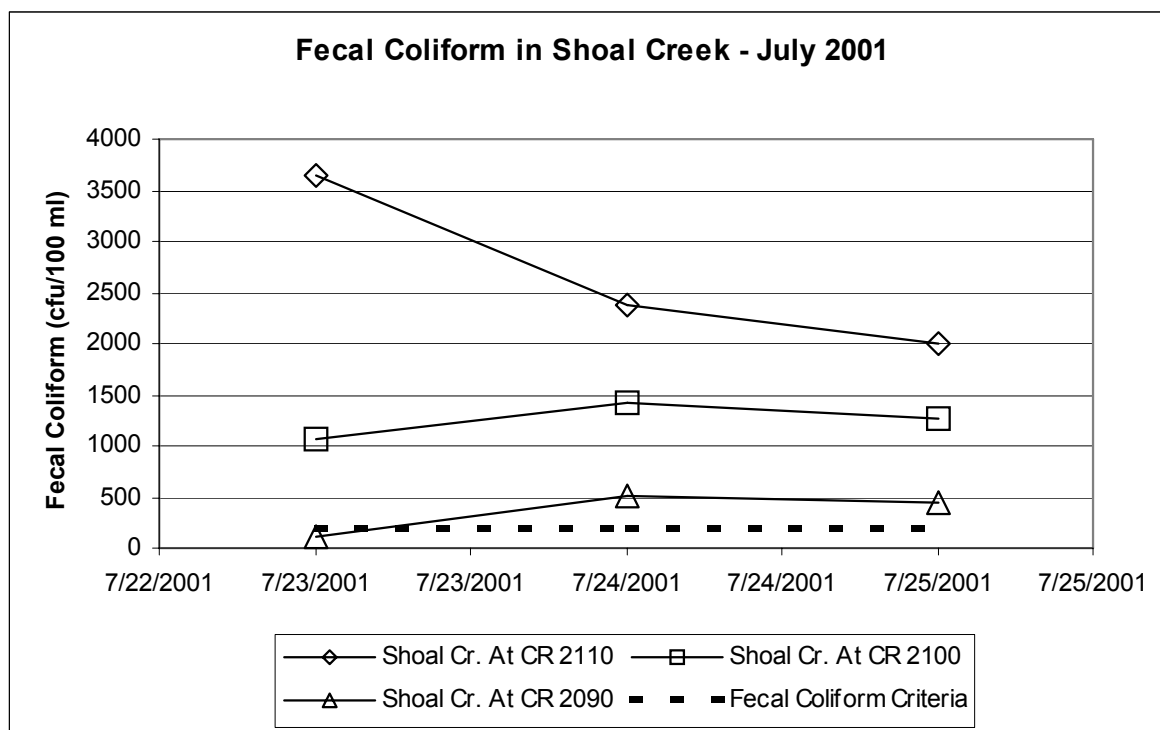
Source: Crowder College



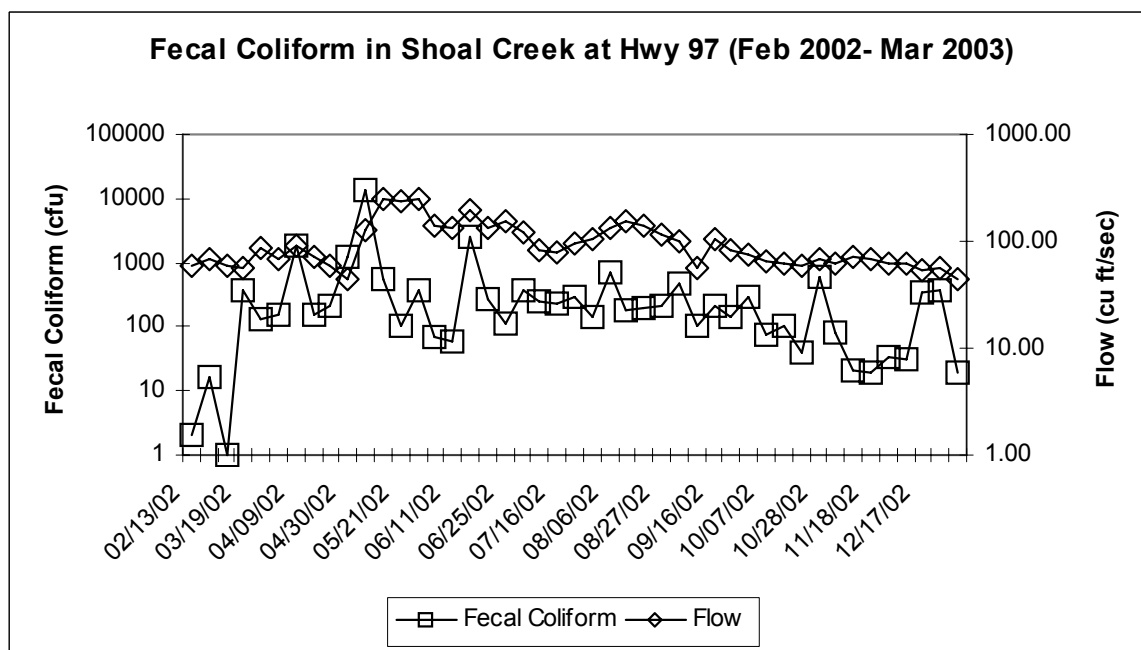
Source: United States Geological Survey



Source: United States Geological Survey



Source: United States Geological Survey



Source: Food and Agriculture Policy Research Institute

For more information call or write:

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